

Claims

1. A boiler convertible between a normal type and a condensing type, the boiler comprising:
  - 5 a combustion chamber for generating high-temperature combustion heat by burning fuel therein;
  - a heat exchange section for applying heat to heating water by absorbing the high-temperature combustion heat; and
  - 10 an outer housing formed at an inner portion thereof with a water reservoir for circulating the heating water, wherein coupling holes are formed in the outer housing, a circulation chamber is formed at a lower portion of the outer housing, a burner is provided at an upper portion of the combustion chamber so as to generate heat in a downward direction thereof, the combustion chamber is vertically installed in one of the coupling holes, a lower portion of the combustion chamber is communicated with the circulation chamber, the heat exchange section includes first and second heat
  - 15 exchangers and is vertically installed in the outer housing adjacent to the combustion chamber, an upper portion of the heat exchange section is coupled to one of the coupling holes and a lower portion of the heat exchange section is communicated with the circulation chamber, and a funnel is provided at an upper portion of the outer housing so as to discharge an exhaust gas derived from combustion of the fuel in the combustion chamber, and a noise-absorbing container is provided at the upper portion of the outer housing so as to connect
  - 20 the funnel with the outer housing.
  - 25
  - 30
2. The boiler as claimed in claim 1, wherein the outer housing is provided at an outer peripheral portion thereof with a hot water heat exchanger.

3. A boiler convertible between a normal type and a condensing type, the boiler comprising:

    a combustion chamber for generating high-temperature combustion heat by burning fuel therein;

5     a heat exchange section including a main heat exchanger for absorbing sensible heat from the high-temperature combustion heat and a latent heat exchanger for absorbing remaining heat and latent heat from an exhaust gas outputted from the main heat exchanger, the

10    heat exchange section applying heat to heating water; and

    an outer housing formed at an inner portion thereof with a water reservoir for circulating the heating water, wherein coupling holes are formed in the

15    outer housing, a circulation chamber is formed at a lower portion of the outer housing, the combustion chamber is vertically installed in one of the coupling holes, a burner is provided at an upper portion of the combustion chamber so as to generate heat in a downward

20    direction thereof, a lower portion of the combustion chamber is communicated with the circulation chamber, the main heat exchanger is vertically installed in the outer housing adjacent to the combustion chamber, the main heat exchanger is accommodated in one of the

25    coupling holes and a lower portion of the main heat exchanger is communicated with the circulation chamber, the latent heat exchanger is vertically installed in the outer housing adjacent to the main heat exchanger and is accommodated in one of the coupling holes, a lower

30    portion of the latent heat exchanger is shielded from the circulation chamber by means of a partition wall formed in the circulation chamber, a funnel is communicated with the latent heat exchanger through a funnel support so as to discharge an exhaust gas of the

35    latent heat exchanger to an exterior, and a noise

absorbing chamber is coupled to an upper portion of the outer housing so as to seal the upper portion of the outer housing while guiding the exhaust gas from the main heat exchanger to the latent heat exchanger.

5

4. The boiler as claimed in claim 3, wherein the partition wall is defined by an outer peripheral portion of the funnel support inserted into the circulation chamber from a lateral portion of the outer housing.

10

5. The boiler as claimed in claim 3, wherein the funnel support discharges condensing water generated from the latent heat exchanger and the funnel towards a neutralization unit.

15

6. The boiler as claimed in claim 3, wherein the outer housing is provided at an outer peripheral portion thereof with a hot water heat exchanger.

20

7. A method for converting a normal type oil boiler into a condensing type oil boiler or vice versa by using a convertible boiler as claimed in claim 1 or 2, the method comprising the steps of:

25

inserting a funnel support into a circulation chamber from a lateral portion of an outer housing of the boiler, thereby forming a partition wall for shielding the circulation chamber from a latent heat exchanger;

30

separating a funnel from a noise-absorbing container and sealing an upper portion of the noise-absorbing container; and

35

allowing the funnel to communicate with the latent heat through the funnel support in such a manner that a main heat exchanger absorbs sensible heat from an exhaust gas and the latent heat exchanger absorbs latent

heat from the exhaust gas while the exhaust gas is being circulated through a combustion chamber, the circulation chamber, the noise-absorbing container, the latent heat exchanger, the funnel support and the funnel.

## AMENDED CLAIMS

Received by the International Bureau 22 July 2005 (22.07.2005);  
Original claims 1-7 replaced by amended claims 1-7 (4 pages).

1. A boiler convertible between a normal type and a condensing type, the boiler comprising:
  - a combustion chamber for generating high-  
5 temperature combustion heat by burning fuel therein;
  - a heat exchange section for applying heat to heating water by absorbing the high-temperature combustion heat; and
  - an outer housing formed at an inner portion  
10 thereof with a water reservoir for circulating the heating water, wherein coupling holes are formed in the outer housing, a circulation chamber is formed at a lower portion of the outer housing, a burner is provided at an upper portion of the combustion chamber so as to  
15 generate heat in a downward direction thereof, the combustion chamber is vertically installed in one of the coupling holes, a lower portion of the combustion chamber is communicated with the circulation chamber, the heat exchange section includes first and second heat  
20 exchangers and is vertically installed in the outer housing adjacent to the combustion chamber, an upper portion of the heat exchange section is coupled to one of the coupling holes and a lower portion of the heat exchange section is communicated with the circulation  
25 chamber, an insertion hole is formed at a lateral portion of the outer housing to insert a funnel support when converting a normal type boiler into a condensing type boiler, and a funnel is provided at an upper portion of the outer housing so as to discharge an  
30 exhaust gas derived from combustion of the fuel in the combustion chamber, and a noise-absorbing container is provided at the upper portion of the outer housing so as to connect the funnel with the outer housing, and the funnel is separable from the noise-absorbing container.

## 2. (Deleted)

3. A boiler convertible between a normal type and a condensing type, the boiler comprising:

5 a combustion chamber for generating high-temperature combustion heat by burning fuel therein;

10 a heat exchange section including a main heat exchanger for absorbing sensible heat from the high-temperature combustion heat and a latent heat exchanger for absorbing remaining heat and latent heat from an exhaust gas outputted from the main heat exchanger, the heat exchange section applying heat to heating water; and

15 an outer housing formed at an inner portion thereof with a water reservoir for circulating the heating water, wherein coupling holes are formed in the outer housing, a circulation chamber is formed at a lower portion of the outer housing, the combustion chamber is vertically installed in one of the coupling holes, a burner is provided at an upper portion of the combustion chamber so as to generate heat in a downward direction thereof, a lower portion of the combustion chamber is communicated with the circulation chamber, the main heat exchanger is vertically installed in the 20 outer housing adjacent to the combustion chamber, the main heat exchanger is accommodated in one of the coupling holes and a lower portion of the main heat exchanger is communicated with the circulation chamber, the latent heat exchanger is vertically installed in the 25 outer housing adjacent to the main heat exchanger, the main heat exchanger is accommodated in one of the coupling holes and a lower portion of the latent heat exchanger is shielded from the circulation chamber by means of a partition wall formed in the circulation chamber, a funnel is 30 communicated with the latent heat exchanger through a 35

5       funnel support so as to discharge an exhaust gas of the latent heat exchanger to an exterior, and a noise absorbing chamber is coupled to an upper portion of the outer housing so as to seal the upper portion of the  
10      outer housing while guiding the exhaust gas from the main heat exchanger to the latent heat exchanger, and  
          the partition wall is defined by an outer peripheral portion of the funnel support inserted into the circulation chamber from a lateral portion of the outer housing.

4. (Deleted)

5. The boiler as claimed in claim 3, wherein the  
15      funnel support discharges condensing water generated from the latent heat exchanger and the funnel towards a neutralization unit.

6. The boiler as claimed in claim 3, wherein the  
20      outer housing is provided at an outer peripheral portion thereof with a hot water heat exchanger.

7. A method for converting a normal type oil  
boiler into a condensing type oil boiler or vice versa  
25      by using a convertible boiler as claimed in claim 1, the method comprising the steps of:

30      inserting a funnel support into a circulation chamber from a lateral portion of an outer housing of the boiler, thereby forming a partition wall for shielding the circulation chamber from a latent heat exchanger;

35      separating a funnel from a noise-absorbing container and sealing an upper portion of the noise-absorbing container; and

          allowing the funnel to communicate with the latent

heat through the funnel support in such a manner that a main heat exchanger absorbs sensible heat from an exhaust gas and the latent heat exchanger absorbs latent heat from the exhaust gas while the exhaust gas is being 5 circulated through a combustion chamber, the circulation chamber, the noise-absorbing container, the latent heat exchanger, the funnel support and the funnel.